User Manual

Magic Lantern Release 0.1.6
For the Canon 5d Mark II

Introduction:

This manual is designed to be a layman's introduction to Magic Lantern release No. 0.1.6. Technical information regarding this release as well as the history and development of Magic Lantern can be can be reviewed at: http://magiclantern.wikia.com/wiki/Magic_Lantern_Firmware_Wiki

Essentially, Magic Lantern is a program that has been primarily developed by Canon 5D Mark II users to load from the CF card on board the camera and for the purpose of providing enhancements to the operating system of the Canon 5D Mark II, in its video and still modes. It is modeled on earlier software developed in the open source community that provided enhancements to Canon Power Shot compact digital cameras. (http://chdk.wikia.com/wiki/CHDK_in_Brief)

Warranty Issues:

Bear in mind that this Magic Lantern release comes with **no warranty** for any use; you use it at your own risk. This project is a project attempting to improve uses of the product for professional level uses and is intended for that purpose. Developers and Users contend that using the Magic Lantern does not harm your camera since it is loaded into the memory only temporarily and if you turn off the camera, it's gone completely. Alpha testers have used Magic Lantern for several versions now, and there have been no reported camera issues developed in using the software. The original camera firmware is left untouched in the camera. There have been two prior released versions as the software and the developers have had no report of any damage arising out of its use.

Canon support maintains that any upgrades to the software of the camera not performed by an authorized Canon Repair Facility or installed as directed by Canon, would void the warranty. Thus you should consider it likely that damage occuring to your camera while using Magic Lantern software would not be covered under your Warranty, should Canon challenge the Warranty on that basis. Whether or not their position would hold up legally, has not been tested.

However, the open source developers of this software are are essentially accessing settings that are available on board the camera as part of the Canon design, and it is unclear how such usage would be determined in a repair situation in any event.

What does Magic Lantern Do: A General Description of Process

Simply stated Magic Lantern 0.1.6 provides a system that allows the user to obtain access to various settings on the camera, that are not available in the Canon 5D Mark II firmware release 1.10, the most recent release, which itself provided some additional manual setting capabilities for video shooting. In fact, in order to use Magic Lantern 0.1.6, you must also be running firmware version 1.10.
The choice of settings can be accomplished by one of two methods. The first is by accessing the Magic Lantern Menu, after starting Magic Lantern. The second method is to make changes on a configuration file, prior to invoking Magic Lantern and then including that configuration on the CF root directory along with the Magic Lantern software before starting Magic Lantern. The Magic Lantern process also allows the saving of the current settings as a repeatable configuration, once the configuration has been set while in Magic Lantern, so the particular setup can be repeatably invoked at start up.

In both cases, the process is started by starting the camera in the standard configuration. That means you start your Canon 5D Mark II as usual, using firmware version 1.10.

Then, with a card that has been loaded with the Magic Lantern 0.1.6, you will select firmware update from the firmware update menu on the camera. After selecting it, the camera will reboot, using Magic Lantern 0.1.6. Nothing in the firmware rewrites or changes the standard firmware on board the the camera. The Magic Lantern Firmware actually supplements the firmware but is not written permanently in the Camera's operating system.

After Magic Lantern is running, the user will:

1. have access to a new set of data reporting on the LCD or monitor,
2. have access to audio level meters
3. have access to zebras on screen (LCD use only)
4. have access to menus for setting of audio gain,
5. set audio monitoring levels
6. invoke design and define and invoke crop marks
7. set histogram on or off
8. set up stack focus for multiple still photos with variable focus.
9. set up automated rack focusing on auto focus lenses
10. save a new configuration setting based on the set up you have made

After completing the use of the camera in Magic Lantern mode, the power of the camera is turned off. This will normally clear the camera of any vestiges of the opearting system, and the camera can then be restarted in the normal firmware operating system. Currently, developers are recommending that users also open, and remove the battery briefly, to assure memory is cleared up restarting of the camera in normal modes.

I.

Preparing Your Compact Flash Card

Any compact flash card that you intend to shoot with Magic Lantern, will have to have magic lantern installed to it. Remember, the card supplies the additional operating instructions for the firmware running on the camera.

About choice of cards: Generally, most cards that can be used with the Canon 5D Mark II in regular mode, will work with Magic Lantern. However, the user should be prepared to consider changing cards should continuous trouble be noted with a particular card or brand of cards.

Preparing the Card for Transfer of Magic Lantern: It is recommended that any card on which Magic Lantern is to be installed be formatted in the Canon 5D Mark II, prior to installation of Magic Lantern on that card.

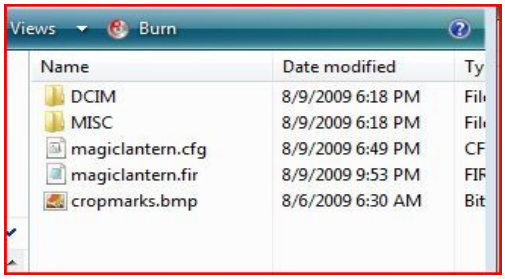
Installing Magic Lantern on your card:

1. Download the latest version of Magic Lantern from this site:

   http://magiclantern.wikia.com/wiki/Magic_Lantern_Firmware_Wiki

2. Extract the zip file to a directory of your choice. In order to preserve prior downloads, use a new directory for each version you download. Otherwise the resulting file may overwrite a prior download.

3. From the download directory, transfer the magiclantern.fir, magiclantern.cfg, and cropmarks.bmp to the root directory of you CF card: Your CF card directory should look like the following as a result of the transfer:



4. For each compact flash card you want to use for recording with Magic Lantern, repeat these steps.

II.

Starting Magic Lantern

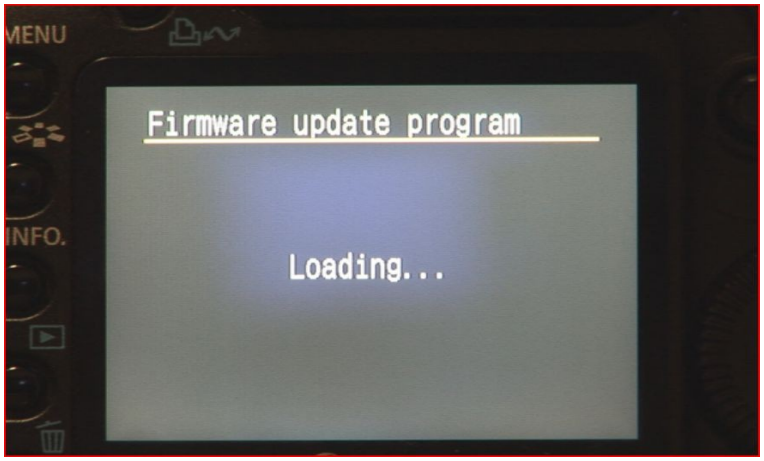
1. Start your camera with the CF card with Magic Lantern installed in the camera card slot.

2. To start Magic Lantern, press the menu button, then locate the firmware update utility. (see picture below)

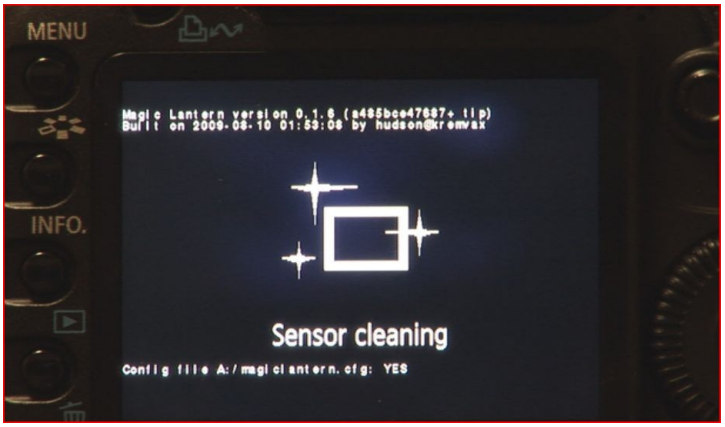
Push the set button after navigating to the firmware line.

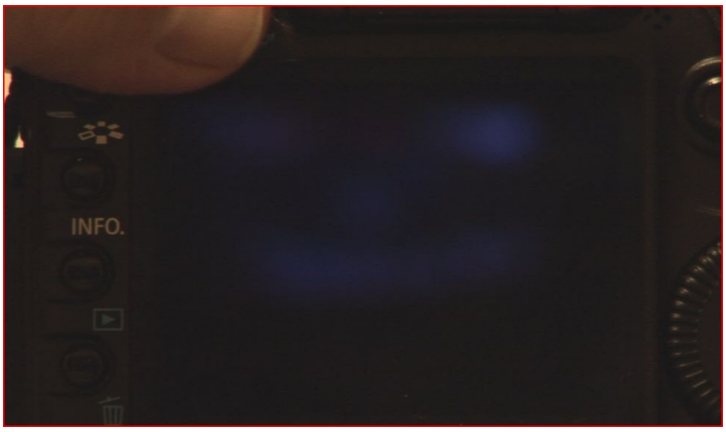
3. Select Okay, when prompted

The Magic Firmware program will the load:



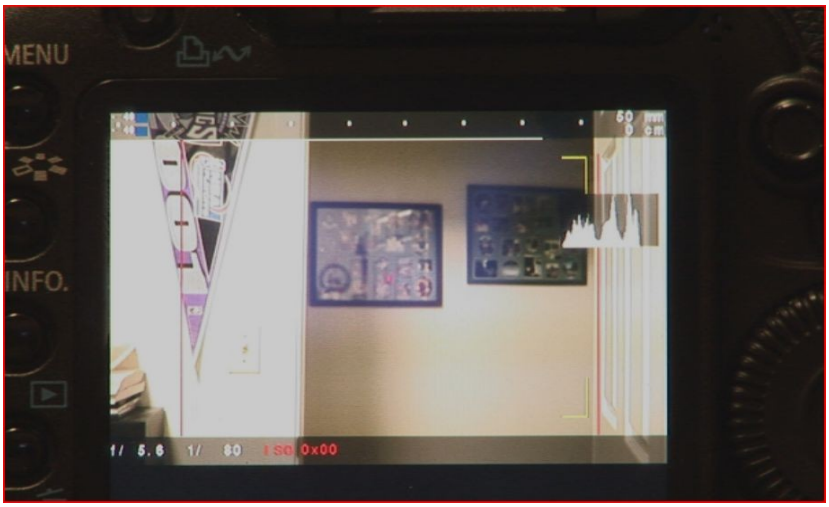
go blank, and then show this screen:





It will then go blank again. If it does not come up after a few seconds, push the Live View button.

Magic Lanterns screen will look something like this now:



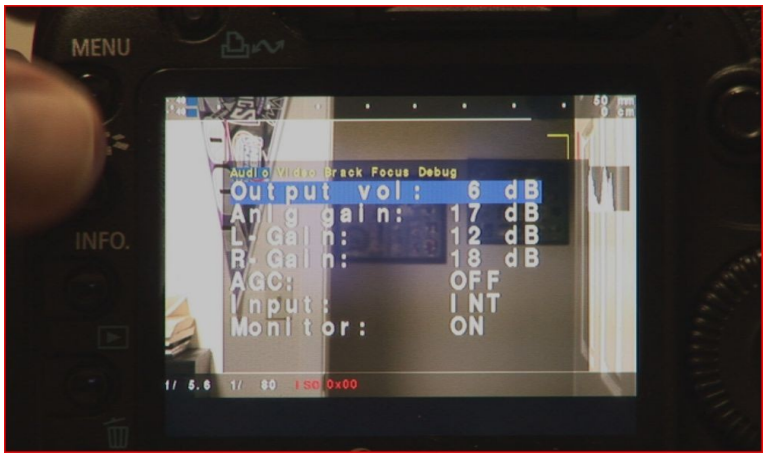
At this point you can just press the “Set” button to record, especially if you had your camera set-up pre-configured in the configuration file. In the next chapters you will learn how to configure various setting, for that purpose.

III

Menu Settings to Configure Your Canon 5D Mark

The sole reason for Magic Lantern is to enhance use of the Canon 5D, by allowing the user to adjust setting that are normally not accessable in the stock Canon firmware. There are five menus in Magic Lantern Version 0.1.6. They are Audio, Video, Bracket, Focus, and Debug.

To Magic Lantern takes over the Picture Style Button on your Canon 5D Mark II, to access the Magic Lantern menu system. Press that button to enter the system. You will see the default Audio screen at start up:



You will toggle to each menu or up and down the menu selections with the four way mini-joy stick. Depressing the joy stick will select changes for the item. The "Set" button can also be used to select.

Audio Settings:

Output vol: This selection provide four settings from 0-6 to set sound levels for sound monitoring from the AV Jack of the Canon 5D Mark II.

Anlg gain: This selection sets analog gain levels.

L.Gain: This selection sets left digital gain level

R.Gain: This selection sets right digital gain level

AGC: This selection toggles audio gain on or off.

Input: INT= internal camera mic, EXT set camera to external mic input.

Monitor: This is on off setting, and on means sound monitoring will go HDMI on playback

Audio Notes:

a. Due to camera design, the highest level may not be sufficient for some monitoring situations without adding a headphone amp. A headphone amp that that can provide further volume control should be employed.

b. Remember that the jack from the AV is an AV jack, and will require actually has two channels of audio, and one channel of audio. Using a two channel standard stereo headphone jack will usually result in only one channel being heard. A special splitter splittion of video and headphone will work to resolve this issue.

c. In early testing of the 5D with standard firmware, it has been noted that monitoring SD throught the AV port can cause a recorded feedback noise. That carries over to Magic Lantern. A notch filter may have to be employed in post to eliminate that sound, if video monitoring is used through the AV port.

d. Best audio is obtained by use of a preamp system fed to the camera. As a general rule, the use of a quiet preamp to send the signal to the camera will result in better the sound recorded in camera. Use of a preamped XLR adapter like the Juiced Link CX 231 or a field mixer will give superior results.

<u>Video Settings</u>

The video setting menu looks like this:

Zebras: This setting toggles Zebras on and off.

Zebra Thrs: This setting toggles through various level of zebras. As of this writing actual values have not been analyzed. The authors believe 0xf000 approximates 100%.

Cropmarks: This setting toggles cropmarks on or off. The Magic Lantern will access a cropmark file in the root directory to write user developed crop marks. There is a sample version provided. The camera can only access a simple 8 bit bitmap file and should be designed within the parameters of the demonstration file provided with your Magic Lantern software download. Under current version, any replacement file must maiting the file name "cropmarks.bmp".

Edgedetect: This function currently is still in development an in current implemention does not provide usable edge detection for focusing purposes.

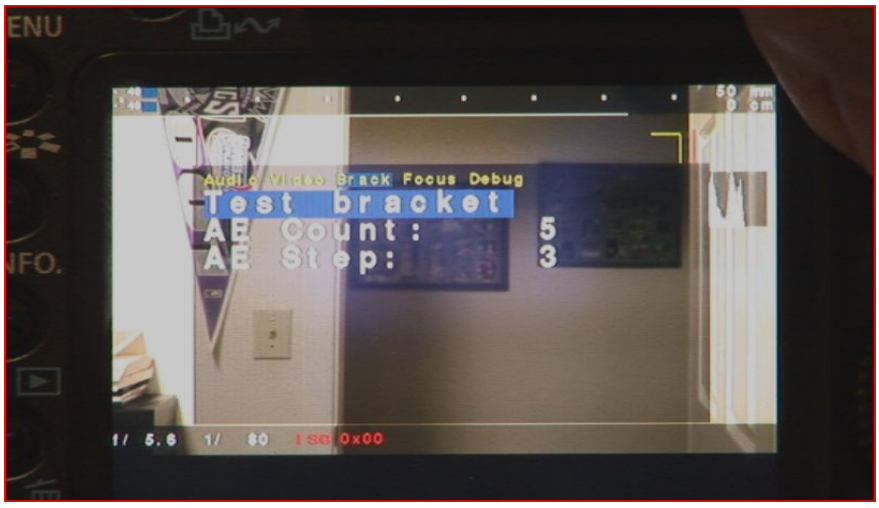
Histogram: Toggles a histogram display.

Video Notes:

a. Zebra currently do not write properly to monitors fed by the Canon 5D. The should therefore be turned of for that use.

<u>Bracket</u>:

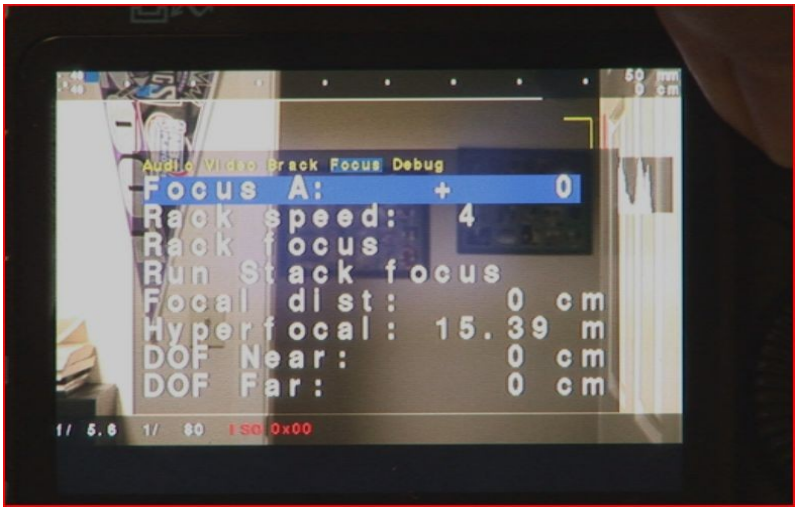
The bracket menu appears as this:



This feature is provided for still photography purposes to test several different exposure level of a scene.

<u>Focus Menu</u>:

The Focus selection Menu appears as follows:



The focus menu system is designed to take advantage of autofocus lenses to provide an automated rack focus for motion filming, and stack focusing for still photography. It is currently in Beta status, and provided for user testing and development.

Settings are as follow:

Focus A: This is the end point of the rack focus. Focus to that point, and depress the selection. Then focus to the starting point.

Rack speed: Sets the focus speed. Select a speed and test and reset as needed.

Rack Focus: Selects actual rack focus action.

Run Stack Focus: This selection will start a series of photographs based on setting below.

Focal Dist:

Hyperfocal:

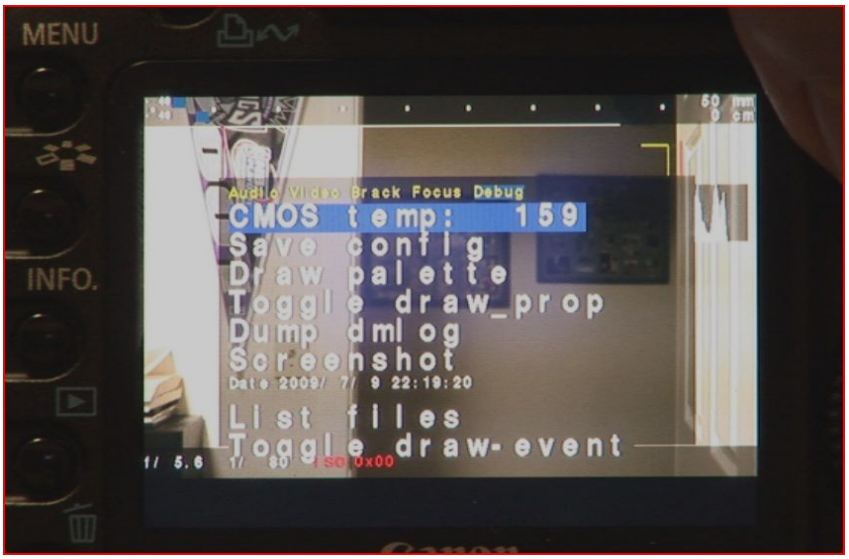
DOF Near:

DOF Far:

Focus Notes:

Debug Menu:

The Debug Menu will appear as follows.



The menu provides various commands designed to help the developers determine what is happening during processes. The general user may asked to provide information about bug reports from these menus.

However, it is expected that the general user will use the Save Config command to develop his how configuration settings for repeatable use. That process is explained more below.

Configuration Files

The basic configuration file on board at first start:

Magic Lantern comes with a basic configuration file, used to set the camera up you can view and modify the file in a test editor such as Note Pad. The configuration file will look like this:

```
# Zebra levels
zebra.level = 61440
zebra.draw = 0

# Edge detection (too slow for real use)
edge.draw = 0

# Crop marks for 2.35:1
crop.draw = 0

# Audio data
# mgain is according to this table:
#     0 == +0 dB
```

```
#     1 == +20 dB
#     2 == +26 dB
#     3 == +32 dB
#     4 == +10 dB
#     5 == +17 dB
#     6 == +23 dB
#     7 == +29 dB
# mgain affects both channels equally.
audio.mgain = 4

# dgain is in dB.  If you want separate gains per channel,
# use audio.dgain.l and audio.dgain.r to set their gains.
audio.dgain = 18 # dB

# mic-power is boolean.  Turn it on if you are using an electret mic
audio.mic-power = 0

# Enable liveview automatically?
# Turn this off if your card has trouble booting or
# with HDMI output connected at boot time.  You will need
# to hit the Live-View button in a few seconds after booting
enable-liveview = 1

# Disable the powersave so that the LiveView never shuts off?
# WARNING -- this can cause problems with your sensor!
# DO NOT LEAVE THE CAMERA ON CONTINUOUSLY.
disable-powersave = 1
```

Many of the settings in the initial configuration file are on off or level settings for various basic features of the camera that are enhanced or brought up by Magic Lantern. "0" will generally mean no, and "1" will mean turn it on. So a "1" at Zebras will turn zebras on and so on.

The user can edit this menu in a text editor, making setting changes. As shown, the initial file contains instructions for setting the configuration settinga

Saved Configuration Files

Magic Lantern will generate a more complete configuration file. After starting Magic Lantern and making settings to your Camera in the Magic Lantern Menus, you can save that current configuration for future start ups in the Debug menu by selecting "Save Config" in that menu. My selecting that, the original Configuration file will be replaced with a new extended configuration file such as the following:

```
# Magic Lantern 0.1.6 (4770e23b8cd9 tip)
# Build on 2009-08-10 22:54:23 by hudson@kremvax
# Configuration saved on 2009/08/10 16:51:20
disable-powersave = 1
debug.draw-event = 0
debug.menu-timeout = 15
debug.draw-prop = 0
debug.timed-dump = 0
```

```
audio.mgain = 5
audio.dgain.l = 18
audio.dgain.r = 12
audio.mic-power = 1
audio.lovl = 3
audio.o2gain = 0
audio.alc-enable = 0
audio.mic-in = 1
audio.loopback = 1
focus.step = 100
focus.count = 5
focus.rack-speed = 4
zebra.draw = 0
zebra.level = 61440
crop.draw = 0
crop.file = A:/cropmarks.bmp
edge.draw = 0
enable-liveview = 1
hist.draw = 0
hist.x = 582
hist.y = 100
timecode.x = 520
timecode.y = 50
timecode.width = 225
timecode.height = 60
timecode.warning = 120
```

You can use this file for future start up, and you may also want to edit further for future startups and develop several different files for various uses. .